FINAL FIELD INVESTIGATION REPORT
AND
SITE REMEDIATION ACTIVITIES WORK PLAN
CHRYSLER CHEMICAL FACILITY
TRENTON, MICHIGAN

Prepared For:

CHRYSLER CORPORATION
DIVISION OF PLANT ENGINEERING
AND ENVIRONMENTAL PLANNING
12000 OAKLAND AVENUE
HIGHLAND PARK, MICHIGAN 48203

Prepared By:

HART ENGINEERS, INC.
PENN CENTER WEST III
SUITE 106
PITTSBURGH, PENNSYLVANIA 15276

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1.0 INTRODUCTION

Hart Engineers, Inc. (HART) is pleased to present the following Work Plan for the remediation of the back lot area of Chrysler Chemical Division's Trenton Facility. This Work Plan is based on the data collected during the Phase II - Subsurface Field Investigation. This submittal will summarize field activities and the data collected during Phase II work and then discuss the procedures which will be utilized during site remediation activities.

The primary goals of the Phase II Field Investigation were:

- o Identify and locate suspected drum burial and surface impoundment units in the back lot area.
- o Define the horizontal and vertical extent of these suspected units.
- o Determine the general types and concentrations of wastes present in each unit.
- o Characterize the extent of soil contamination in the identified areas.
- o Identify the distribution of exposed asbestos materials in the back lot area.
- o Define the vertical extent of soil contamination in the underground tank farm area.

The investigation was successful in meeting these goals. From this, HART was able to recommend various remedial options to Chrysler for this site. This Work Plan presents the remedial alternative selected by Chrysler for implementation. The Work Plan will describe the remedial alternative through an interpretation of the results of the field study, leading then to a presentation of the activities to be undertaken to achieve the desired remediation. These activities include:

- Clearing and grubbing of site.
- Development of a decontamination pad.
- Development of staging areas at the site.
- Excavation and staging of waste materials.
- Testing and classification of materials.
- Transport and Disposal.
- Backfill procedures.
- Site revegetation.

Each activity is discussed within the Work Plan in the following sections, to the extent necessary to accurately depict the remedial approach.

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FIELD ACTIVITIES LOGIC DIAGRAM

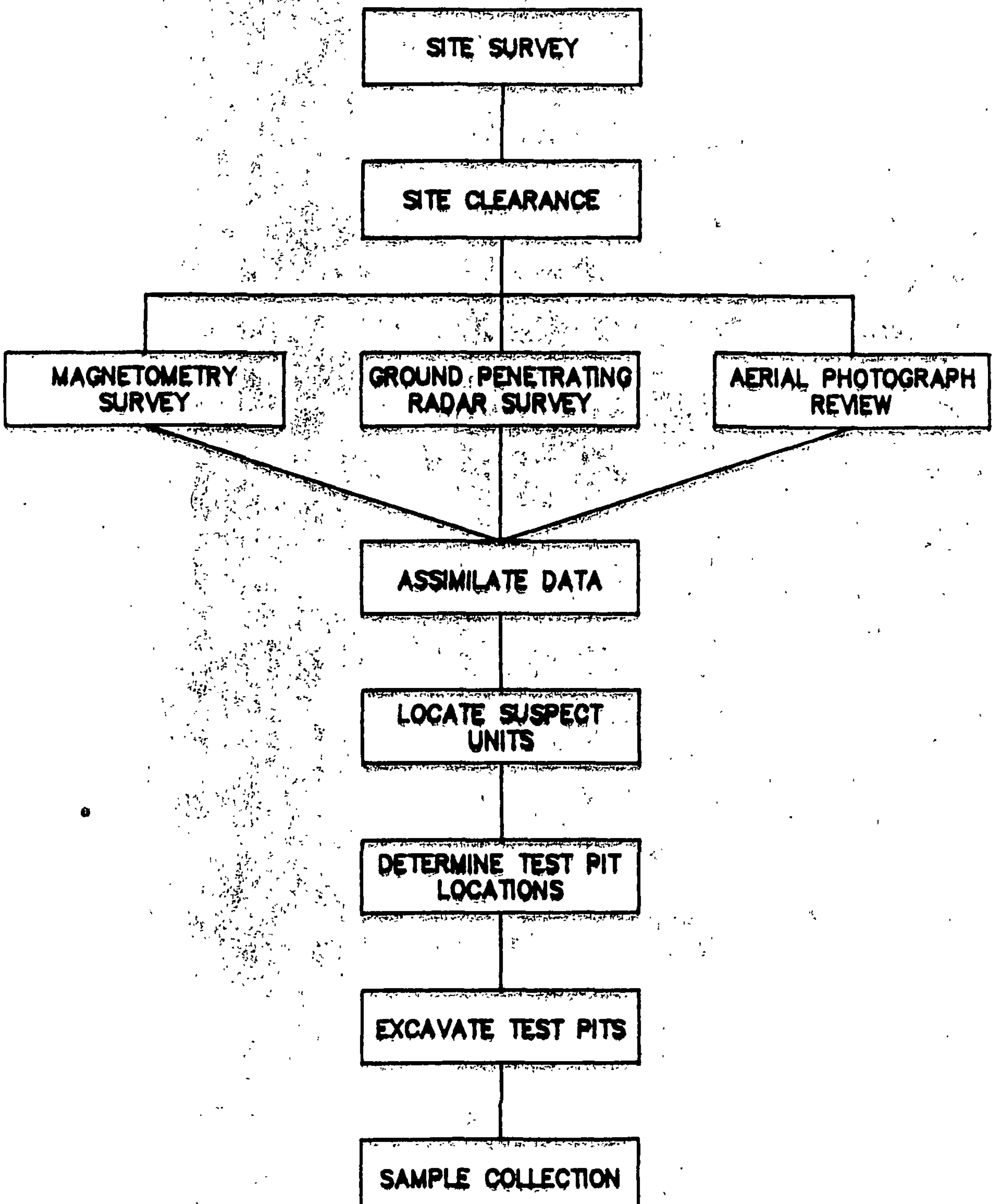

FIGURE 1

2.0 FIELD ACTIVITIES

This section outlines the field activities that occurred on-site during Phase II work and includes:

- Surveying of the back lot to establish a sampling grid;
- Clearing access for the geophysical work;
- Geophysical Survey - magnetometry;
- Geophysical Survey - ground penetrating radar (GPR);
- Test pit excavation;
- Sample Collection.

Figure 1 is a logic diagram summarizing the process by which the field investigation was conducted. A summary of the actual project scheduling of these activities is presented in Figure 2.

2.1 Survey of Back Lot

Initially, HART determined it was essential to establish a grid pattern over the back lot area so that all data generated during the geophysical survey, the excavation and sampling of test pits could be referenced directly and accurately back to the site grid location.

HART personnel assisted a survey crew in laying out four (4) east-west base lines which were referenced to the southeast corner of the Friction Products Building. On each base line, every 20 foot interval was staked out and labeled to facilitate referencing data coordinates during field activities (see Drawing E-3).

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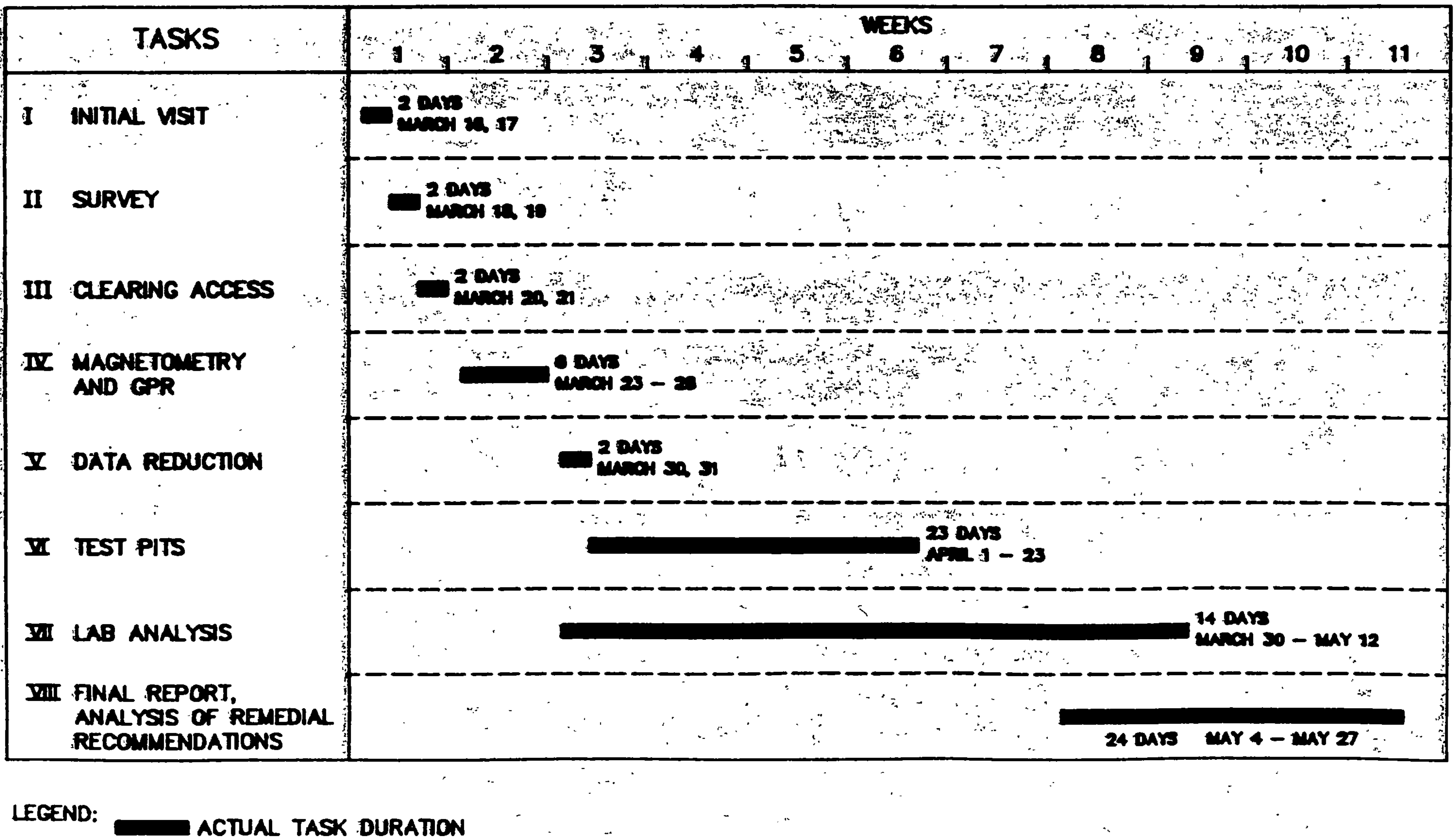
CHRYSLER CHEMICAL FACILITY
TRENTON, MICHIGAN
PROJECT SCHEDULE SUMMARY



2.2 Clearing Access

Once the surveyed grid pattern was established it was then necessary to clear access paths transecting the site prior to conducting the geophysical surveys. These paths were cleared on 20 foot centers perpendicular to the four (4) base lines established by the survey crew.

The clearing of these transect lines:

- o Facilitated the mobilization of the geophysical survey crews (ground penetrating radar and magnetometry).
- o Aided in the test pit excavation phase of the investigation.
- o Assisted in documentating the coordinates of data with the grid system.

2.3 Physical Survey - Magnetometry

A HART field team utilized a magnetometer in an attempt to locate suspect drum burial units in the undeveloped back lot area. The magnetometer is capable of measuring the earth's magnetic field and its changes. Buried metal objects will alter the intensity of the magnetic field received by the magnetometer and objects are displayed as anomalous data.

Three (3) measurements of the magnetic field's intensity were obtained on twenty (20) foot centers throughout the backlot. Overall, 1,301 measurements were recorded in this phase of the geophysical survey.

Once the three (3) measurements were recorded and corrected for diurnal variations they were assigned a value corresponding to . . .

Value	Representation
3	Highly anomalous Data
2	Moderately anomalous Data
1	Slightly anomalous Data

These values were plotted on a base map and referenced to the original grid. Areas in which no anomalous data was generated were left blank on the base map. Areas identified to be highly anomalous were identified and delineated on the base map.

Upon reviewing the data generated by the magnetometry survey four (4) areas suspected of containing buried metallic objects were identified (refer to Appendix I, Drawing E-1). Two (2) of these areas were in the north portion of the back lot and two (2) were in the south portion. The location of the largest area in the south portion corresponded to the location of past excavations identified in aerial photographs of the facility taken several decades ago. It was in this area that the drum trenches were believed to exist.

The smaller area identified in the south portion and one of the areas in north portion contained surficial drums and other types of metallic scrap. Although the presence of these objects may have caused the anomalous readings in this area the data was such as to warrant further geophysical investigations of these areas.

2.4 Geophysical Survey - Ground Penetrating Radar (GPR)

The point source data generated by the magnetometry survey was complemented by a GPR survey which provided continuous data along the transect lines covered.

Ground penetrating radar (GPR) operates on the same principle as aircraft radar. A short pulse of electromagnetic radiation at microwave frequencies, is projected into the ground and reflections are produced from any discontinuties in the subsurface dielectric constants. The reflected energy is received by a transducer at the surface and the time differential between the initial transmission of the electromagnetic pulse and the reception of the reflected wave is measured. This time differential is converted to a depth measurement which is plotted on a chart recorder. Buried containers having different dielectric constants than surrounding soil show up as anomalous reflections on the chart recorder.

HART supervised a field team provided by Geophysical Survey Systems, Inc. A 120 megahertz (MH_z) transducer was pulled along the ground surface recording continuous data on twenty (20) foot transects sixty (60) transect lines were recorded producing over 20,925 linear feet of data.

A map illustrating the areas of anomalous readings detected by the GPR survey is included in Appendix 1, Drawing E-2.

2.5 Test Pit Excavation

The data from the geophysical survey (magnetometry and ground penetrating radar) was reviewed, reduced and then plotted on a base map. This data was further supplemented with historical aerial photographs obtained from plant files. By overlaying all the base maps, aerials and other available information, units suspected of containing buried waste were identified and located on the base map.

Suspect areas identified during the magnetometry survey may have been ruled out as areas of future investigation after additional geophysical work was completed. For example, the magnetometer identified one (1) small area in the southern portion of the back lot as being a likely candidate for containing buried metal objects. During the magnetometry survey it was noted that a large amount of surficial metal existed in this area and the anomalies recorded by this instrument may have been caused by these metal objects or by metal lying just beneath the surface. Ground penetrating radar confirmed this hypothesis and this small area was eliminated as a site for further investigation.

The objective of the next phase in the investigation was to confirm the presence of these suspect units and to determine the lateral and vertical extent of any contamination associated with them through direct sampling. Test pit locations were proposed around the perimeter and in the interior of each suspect unit.

Chemical Waste Management (CWM) was subcontracted to perform the excavation of the test pits. They also provided the necessary equipment (decontamination equipment, disposable clothing, respiratory protection and the proper metering instrumentation) to perform excavations in areas of suspected hazardous waste disposal.

Utilizing a Cat 225 backhoe excavator test pits were excavated to a depth at which either waste or groundwater was encountered. All excavations were logged by a HART hydrogeologist noting such features as overall depth, vertical and horizontal strata changes, types of fill, presence of waste material, staining, ground water depth, presence of free product, presence of organic vapors and the excavations coordinates. (Refer to Appendix I, Drawing E-3 for test pit location map and Appendix II for test pit logs).

While excavating test pits several drums were accidentally punctured by the bucket of the backhoe and in some instances the contents migrated to the surrounding soils. In these cases, the excavation was closed, immediately capped with visqueen and marked. These areas were referenced as first targets for future remedial activities.

The primary objective for the test pit excavations was to visually identify the vertical and horizontal extent of the contamination associated with each suspect unit. A sampling plan based upon the visual limits of the units was then implemented to generate the analytical data necessary to document the extent and type of contamination encountered.

2.6 Sampling

Samples were collected from excavations in the back lot to:

1) Identify and quantify waste types present within a specific unit and/or;

2) Help define unit boundaries (both vertical and horizontal) by confirming the presence/absence of contamination.

Sampling locations are presented in Appendix I, Drawing E-3. Two (2) general types of samples were collected from the back lot area - waste samples and soil samples. Waste samples were collected either from 55-gallon drums or from waste encountered in the excavation. These samples were in the form of one (1) of three (3) matrixes: solid, liquid or sludge. Data generated from the analysis of these waste samples was used in identifying specific waste types and their respective concentrations. This information will be valuable in formulating future remedial activities.

Soil samples were collected at discrete points determined by both visual and instrument (organic vapor analyzer, OVA) observations made by HART's field personnel. Sample locations were generally located outside of suspected unit boundaries so that these boundaries could be confirmed through laboratory analyses. Each unit had proposed four (4) test pit locations corresponding to each side of the unit, except when overlapping of units occurred. At each of these locations, three (3) soil samples were collected (unless field conditions were prohibitive) at 3', 6' and 8' depths.

In the interior of each unit an additional sampling location was determined by field personnel and three (3) soil samples were collected as above. This was done so that the vertical extent of the unit could be determined.

All soil samples were submitted to the laboratory for a full range priority pollutant scan and RCRA characterization unless specific parameters not covered by these analyses were of interest. By integrating the data generated by the exterior and interior unit soil samples it was possible to estimate volumes of contaminated material contained within each unit.

Additionally, surficial soil samples were collected independent of the excavations in order to determine the extent of exposed asbestos materials.

In summary, the sampling conducted in the back lot allowed for the:

- Identification of waste types and concentrations.

- Delineation of waste disposal unit boundaries, both vertical and horizontal.

- Calculation of estimated volumes of contaminated material.

- Characterization of area with exposed asbestos.

Data associated with the sampling campaign is presented in the following section.

3.0 PRESENTATION OF FIELD DATA AND ANALYTICAL RESULTS

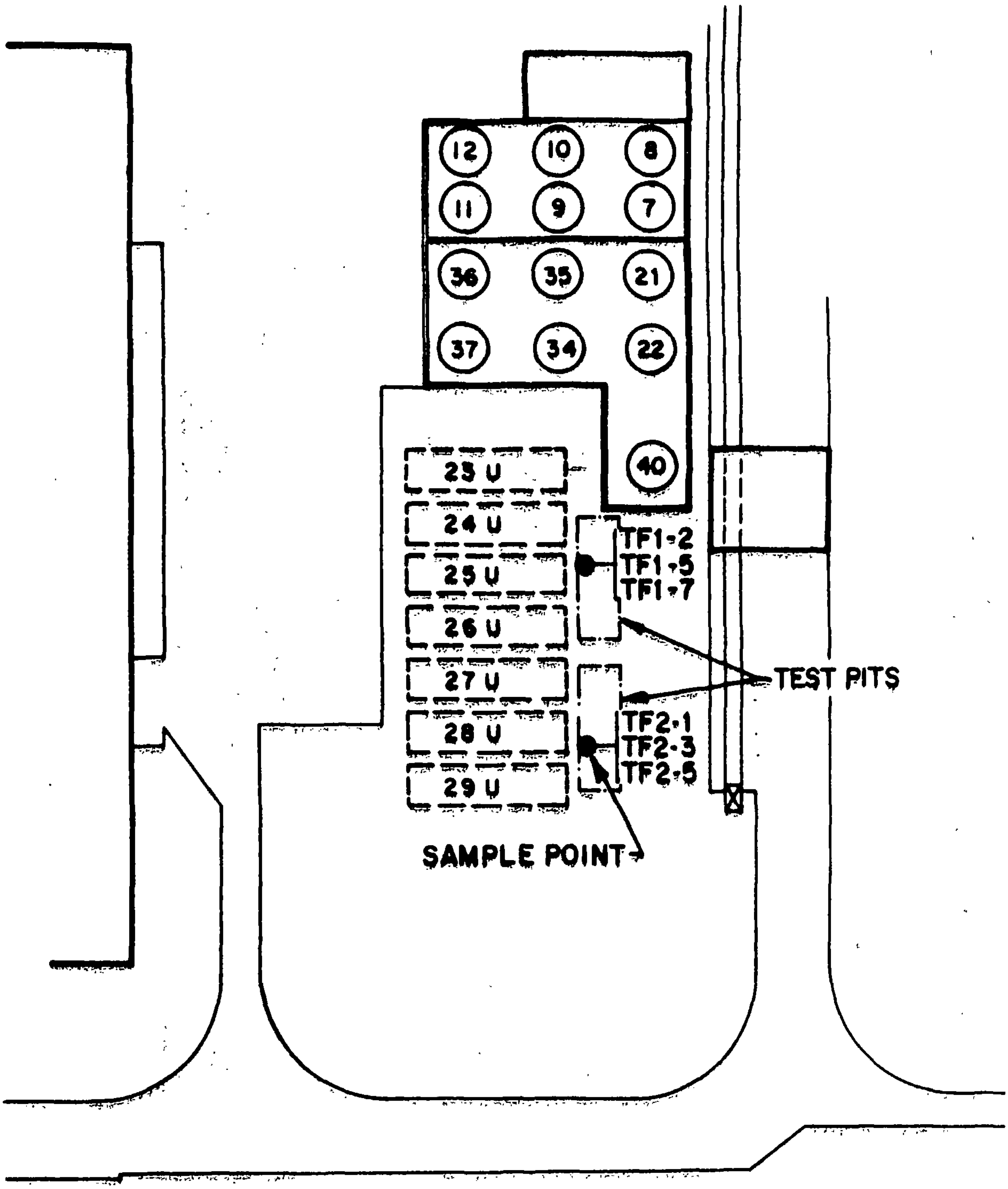
Field data and the analytical results obtained from soil and waste samples collected during the investigation are presented by location and waste type for the following areas:

- o tank farm area;
- o asbestos sampling in back lot area;
- o south back lot area;
- o north back lot area.
- o friction products building

3.1 Tank Farm Area:

Two test pits were excavated at the easterly end of the Tank Farm Area (Figure 3). A petroleum based hydrocarbon was visually observed in both test pits at a depth of about six (6) feet (see test pit logs Appendix II). A sample of this saturated material (TF2-3) was collected and submitted for emergency turnaround analysis for full range priority pollutants, total petroleum hydrocarbons (TPH), and a gas chromatography (G.C.) scan. Results of these analyses (see Appendix III for formal laboratory data) were inconclusive and did not allow a direct correlation to be made between the contamination encountered and any one of the tanks in the Tank Farm.

In an attempt to identify the source of contamination, the product in each of the seven (7) tanks was sampled and submitted for G.C. scans. Scans of oils in the seven (7) tanks compared with that of soil sample TF2-3 showed a correspondence between the chromatograms of the soil extract and those of tanks 25 (base oil) and 27 (cutting oil). However, tanks 26 (mineral seal oil) and 29 (honing oil) exhibited chromatographic peaks which matched portions of the soil extract chromatogram.



TANK FARM TEST PITS AND SAMPLE LOCATIONS

FIGURE 3

The next steps of the investigation in the tank farm area involved tank testing to determine if tanks were the source of current contamination. O'Brien and Gere were contracted to do the actual testing of the seven (7) tanks and the results of their investigation are presented in Table 3-1. The results give no indication that the contamination found in the tank farm area is a result of leaks existing in one or more of the tanks. Therefore, the contamination present in the tank farm area appears to be directly related to spills that could have occurred during loading operations.

Five (5) additional soil samples were collected from the Tank Farm test pits in order to help define the extent and type of contamination present in this area. Results of the analyses of these samples are summarized in Table 3-2 (formal lab reports are included in Appendix III). All results are in parts per million (ppm).

The results indicate the presence of significant petroleum hydrocarbon contamination (16,100 - 33,300 ppm) from the surface to a depth of six (6) feet. As depth increases beyond six (6) feet the petroleum contamination appears to taper off. This phenomenon is evident in the samples collected at ten (10) feet; TPH concentrations at this depth ranged from 105-760 ppm.

Several base/neutral compounds, ranging in concentrations from 0.8 - 5.7 ppm, were identified in the upper six (6) feet of both test pits. Only one base/neutral compound, Di-n-Butylphthalate (0.58 - 1.06 ppm) was present at depth in both test pits.

Some metals were present in higher concentrations at depth as compared to near surface soils, but levels found are typical background concentrations in soils.

Summary of Tank Farm Area:

Waste Type

Petroleum Hydrocarbons in concentrations ranging from 105-33,300 ppm. Several base/neutral organics compounds in excess of 5 ppm. Several metals (5-45 ppm).

TABLE 3-1

CHRYSLER CHEMICAL DIVISION
TRENTON, MICHIGAN
RESULTS OF TANK INTEGRITY TESTING
PERFORMED BY O'BRIEN & GERE

TANK NO.	CONTENTS	TEST DATE	RESULTS*	REMARKS
18	Empty	5/20/87	-.006/Tight	
23	DIDP-551	5/09/87	+.011/Tight	
24	Exxon 1502	5/20/87	-.371/Fail	
24	Exxon 1502	5/29/87	+.030/Tight	Air Bled From Piping For Retest
25	Base Oil	5/09/87	-.025/Tight	
26	Mineral Seal Oil	5/29/87	-.603/Fail	
26	Mineral Seal Oil	6/08/87	-.034/Pass	Air Bled From Piping For Retest
27	Cutting Oil	5/29/87	+0.12/Tight	Suction Piping Not Tested
28	Xylol	6/08/87	-.006/Tight	
29	Honing Oil	6/15/87	-.023/Tight	
43	Gasoline	6/08/87	-.035/Tight	
44	Gasoline	6/15/87	-.003/Tight	

*Absolute leak rate given in gal/hour. Per NFPA 329, rate less than $\pm$0.05 gal/hour considered tight.

Table 3-2
Chrysler-Trenton Chemical
Tank Farm Data - Soil Samples
Parts Per Million (ppm)

Parameter	TF1-2 (6-18")	TF1-5 (6")	TF1-7 (10")	TF2-1 (2")	TF2-5 (10")
Total Petroleum Hydrocarbons	16,100 ppm	33,300 ppm	760 ppm	2,200 ppm	105 ppm
Volatile Organics	BDL[1]	N/A[2]	BDL	BDL	BDL
PCB's*	BDL	BDL	BDL	BDL	BDL
Pesticides	BDL	BDL	BDL	BDL	BDL
Bis (2-ethylhexyl) phthalate	5.69	BDL	BDL	BDL	BDL
Chrysene	2.91	BDL	BDL	BDL	BDL
Di-n-Butylphthalate	BDL	BDL	1.06	1.28	0.58
Fluoranthene	4.33	BDL	BDL	BDL	BDL
2-Methyl Naphthalene	BDL	BDL	BDL	0.79	BDL
Phenanthrene	5.51	4.19	BDL	3.09	BDL
Pyrene	3.12	BDL	BDL	BDL	BDL

BDL - Below Detection Limit
N/A - Not applicable - Analysis not performed

* Due to matrix type, dilutions were necessary that raised detection limits for PCB's from 5.0 ppm to 25.0 ppm for samples TF1-2 and TF1-5.

Extent of Contamination
Significant petroleum hydrocarbon contamination appears to exist from 0-6'. Most organics are also present in this area. Metals, however, only detected at 10'.

Estimated Volume of Contaminated Material Remedial Needs
Further field work is needed to define horizontal extent of contamination, followed by work to define remedial needs.

3.2 Asbestos

Asbestos sampling was carried out over much of the back lot area with particular attention focused at the drainage swale and areas immediately adjacent to the Friction Products Building. Figure 4 is a map identifying the asbestos sampling locations and the distribution of data.

A total of forty (40) surficial soil samples were collected during the asbestos sampling campaign. Only six (6) of these forty (40) samples exhibited concentrations of asbestos above detectable limits. Two samples near the drainage swale (Sample No.'s 17 and 19) possessed asbestos concentrations from 3-4% chrysotile. Sample 35, located near the Detroit River in the overflow basin of the swale, exhibited chrysotile in concentration of less than 1%. The remaining three (3) samples (No.'s 1, 21 and 22), with asbestos concentrations of 1-3% Chrysotile, were located in the western portion of the site, 200 to 400 feet from the swale.

Summary of Asbestos Sampling in Back Lot Area:

Waste Type
Asbestos (Chrysotile) 1-4%

Extent of Contamination
Contamination by asbestos appears to be random throughout the back lot as indicated by analytical results.

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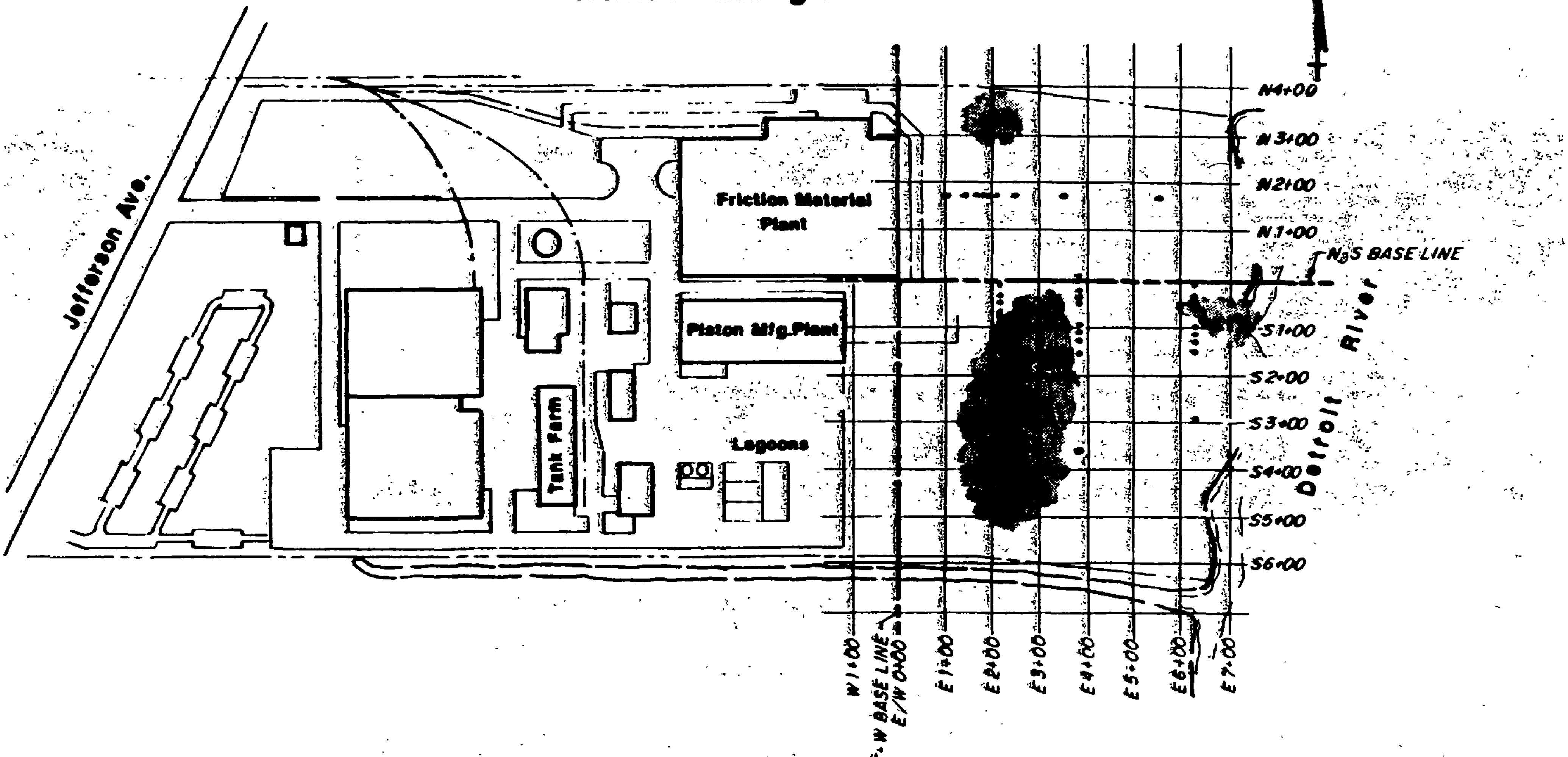
Trenton Michigan



ASBESTOS SAMPLING LOCATIONS AND DATA DISTRIBUTION

FIGURE 4

Estimated Volume of Exposed Material/Remedial Needs

Unable to accurately estimate, however, the only issue is exposure. One foot of soil cover with adequate vegetative growth will address this issue, except in drainage swales and piping. Swales need to be cleaned out, lined with geotextile and be riprapped for erosion protection.

3.3 South Area of Back Lot

Because of the complexity of the units and the waste identified in the southern area of the back lot, each unit defined during field investigations, will be addressed separately in this section. The areas are: Area "B" (drum burial); Area "C" (drum trenches); Area "D" (oil lagoon)' Area "E" (solvent area); Area "H" (sludge disposal area). Appendix I, Drawing E-3 delineates unit boundaries as determined by both field and analytical data.

3.3.1 Background Metal Concentrations

In order to determine whether E.P. Toxicity metal concentrations encountered while test pitting were normal for the back lot area or elevated due to possible contamination, it was necessary to establish background concentrations. To do this a soil sample had to be collected in an area that was believed to be free of contamination present elsewhere on-site. Such a sample was collected during HART's initial field monitoring activities, soil sample no. 1001. The sample was collected east of the Friction Products Building and away from all suspect waste management units and is believed to exhibit metal concentrations indicative of background for the back lot area. The data generated from the analysis of this sample's leachate (E.P. Toxicity Analysis) is presented in Table 3-3 and will be used in determining whether or not the waste management units identified during Phase II Field Activities are contributing to site contamination.

Table 3-3
Chrysler - Trenton Chemical
Background Metal Concentration
Sample No. 1001
E.P. Toxicity Analysis
Parts Per Million (ppm)

Element	Result	Maximum Allowable Concentration
Antimony	ND	
Arsenic	ND	5.0
Beryllium	ND	
Cadmium	ND	1.0
Chromium	ND	5.0
Hexavalent Chromium	ND	
Copper	ND	
Mercury	ND	0.2
Nickel	0.41	
Lead	4.1	5.0
Selenium	ND	1.0
Silver	ND	5.0
Thallium	ND	
Zinc	1.4	

3.3.2 Area "B" - Drum Burial

A total of eight test pits were used to define this area (Appendix I, Drawing E-3). Visual observation indicated the presence of buried drums at a depth of three to four (3-4) feet. The drums were in groups ranging in number from two to six (2-6), and the groups were spaced on an average of four (4) feet apart. Most of the drums encountered were breached and their integrity was poor. Drums appeared to contain solidified resins, grease, paint sludges and some free liquid. Ground water was encountered at an average depth of nine (9) feet and a hydrocarbon sheen was observed on the ground water in most pits. In several of the test pits, a hydrocarbon type product was observed pooling at depth.

Analytical tests performed on the waste materials contained within the 55-gallon drums identified several volatile organics (chlorobenzene, dichloroethene, trichloroethene, toluene and xylene); and base/neutral compounds (acenaphthene, fluorene, naphthalene, dibenzo furan, and 2-methyl naphthalene). Drummed waste that was sampled, did not exhibit E.P. Toxicity. However, one drum did contain a material with a flash point less than 60°C or 140°F. A brief summary is presented in Table 3-4 identifying the highest concentrations of the compounds found in the various drums sampled. Formal analytical reports are in Appendix III.

In order to determine the vertical extent of the contamination encountered in Area "B" several soil samples were collected from the interior of the unit. A summary of the analytical results obtained for these samples is presented in Table 3-5. All concentrations are in parts per million (ppm) (see Appendix III for lab reports).

The results suggest that there exists very little or no organic contamination from the surface to six (6) feet. There was also no indication of any constituents exceeding E.P. Toxicity allowable limits.

Table 3-4

Chrysler - Trenton Chemical
Analytical Results From 55-Gallon Drums In Area "B"
Parts Per Million (ppm)

Parameter	Concentration (ppm)
Chlorobenzene	20.60
Dichloroethene	16.50
Ethylbenzene	6,100
Trichloroethene	124
Toluene	33,400
Total Xylenes	11,40
Acenaphthene	52,200
Fluorene	919
Naphthalene	5,690
Dibenzo Furan	8,690
2-Methyl Naphthalene	68,700

Table 3-5
Chrysler - Trenton Chemical
Analytical Results - Soil Samples From Interior
of Unit "B"
Parts Per Million (ppm)

Parameter	B5001 (3')	B5002 (6')
Benzene	BDL[1]	BDL
Chlorobenzene	BDL	BDL
Toluene	BDL	BDL
Xylenes	BDL	BDL
Acenaphtene	BDL	BDL
1,2 Dichlorobenzene	BDL	BDL
Naphthalene	BDL	BDL
Phenanthrene	BDL	BDL
2-methyl Naphthalene	BDL	BDL
Di-benzo furan	BDL	BDL
Phenol	BDL	BDL

[1] BDL - Below Detection Limits
[2] N/A - Not Applicable, Parameter Not Tested For.

Soil samples were also collected along what was believed to be the outer most boundaries of Area "B" in order to confirm the positions of these boundaries. Four (4) locations were chosen consistent with the four (4) sides of the unit. At each location three (3) samples were collected, one at 3', 6' and 8' (see Appendix I, Drawing E-3 for sample locations).

Data generated from the analysis of these samples indicated the presence of chlorobenzene (22.3-36.1 ppm) and trichloroethene (7.11 ppm), two (2) volatiles also found in waste samples in this area.

Supplementing the field data with the analytical results for this area (see Appendix III for lab reports) adjustments were made to the unit's boundaries to assure that only contaminated material was contained within the units boundaries. These corrected boundaries are presented in Appendix I, Drawing E-3.

Summary of Area "B" - Drum Burial Unit

Waste Types

High concentrations of volatile organics and base/neutral compounds identified in buried drums and adjacent soils.

Extent of Contamination

Estimate 800-2,500 buried 55-gallon drums. Field and analytical data indicate this unit to occupy an area of approximately 10,800 $ft.^2$. Buried drums located between 0 and 6 feet in depth.

Estimated Volume of Contaminated Material

Removal of drums only - 2,400 yd^3. Removal to saturated zone 3,600 yd^3 (includes the 2,400 yd^3 indicated above).

3.3.3 Area "C" - Drum Trenches

Area "C" was first identified by the use of aerial photos. The existence of the drum trenches was further supported by the data generated by the magnetometry survey (see Appendix I, Drawing E-1). Test pitting was quite extensive in this area and identified the possible existence of six (6) trenches. Area "C" (as identified in Appendix I, Drawing E-3) contains these suspect trenches along with tests of adjacent soils, that in some cases, do exhibit contamination that is consistent with that found near the actual drum trenches.

A total of twelve (12) test pits were excavated in Area "C". Buried 55-gallon drums were encountered in such a way as to suggest the presence of several drum trenches that had been disturbed at some time in the past. The condition of the drums varied from location to location. The majority were severely mangled and crushed, however, several appeared to be intact. A large amount of the drums contained or appeared to have contained greases and paint sludges. The average depth of the buried drums was three (3) feet.

The soil in this area was littered with construction debris and a characteristic black staining appeared just above ground water. Dried paint sludges and deposits of what appeared to be oxidized metal complexes were present from zero to six (6) feet over much of this area.

Soil samples collected from the middle of this unit contained significant concentrations of halogenated organics, volatile organics and several base neutral compounds. Samples did not exhibit E.P. Toxicity. Among the most prominent organic contaminants were: chlorobenzene (13,900 ppm), 1,1-Dichloroethane (391 ppm), Ethylbenzene (860 ppm), 1,1,1-Trichloroethane (2550 ppm) Toluene (25,900 ppm), xylenes (8640 ppm), Naphthalene (132 ppm) and 2-methyl naphthalene (189 ppm). Also, several metals were identified. Table 3-6 contains of the analytical data obtained from the interior of area "C". Sample locations can be found in Appendix I. Drawing E-3; laboratory reports are in Appendix III. All concentrations are in parts per million (ppm).

Table 3-6
Chrysler - Trenton Chemical
Full Range Priority Pollutants
Area "C" - Soil Samples
and
RCRA Characteristics
Parts Per Million (ppm)

Parameter	C5001 (3')	C5002 (6')	C5003 (8')
Benzene	BDL	34.1	BDL
Chlorobenzene	2,580	13,900	7,030
1,1-Dichlorobenzene	BDL	14.0	BDL
1,1-Dichloroethane	28.9	391	132
1,1-Dichloroethene	BDL	86.4	BDL
Ethylbenzene	265	860	80
1,1,1-Trichoroethane	108	2,550	155
Toluene	4,220	25,900	4,260
Xylenes	2,490	8,640	554
1,2-Dichlorobenzene	16.6	30.9	33.5
Naphthalene	23.4	132	83.6
Phenanthrene	13.7	54.4	37.8
2-Methyl Naphthalene	16.8	189	BDL
Phenolics	95.4	BDL	79.5
Flashpoint	>60°C	<60°	>60°
Bielstein	N/A	Negative	Positive

N/A - Not Applicable
* E.P. Toxicity Analysis on Leachate

The above results indicate that toluene, xylene and a number of chlorinated organics are present in significant concentration from three (3) to eight (8) feet. Within this interval, it appears as if the concentration of contaminants is greatest at six (6) feet.

Soil sample C5002, collected at six (6) feet, exhibited a flash point of less than 60^{o}C or 140^{o}F. This means that the soil in the area may be hazardous as defined by RCRA regulations. The Bielstein test performed on soil sample C5003 (8 feet) was positive, indicating the presence of one or more halogenated organics.

A sample of product (C-6) collected from the most northern end of test pit C-6 (see Appendix I, Drawing E-3) contained polychlorinated biphenyls (PCB's), arochlor 1254, in a concentration of 67.4 ppm (see HART's July 6, 1987 report, Appendix IV, results of Polychlorinated Biphenyl (PCB) Sampling of Chrysler's Trenton Chemical Facility, for further PCB discussions).

From the above results it appears as if contamination may occur to a depth of eight (8) feet, on the average, throughout this unit.

Perimeter sampling performed to confirm unit boundaries, indicated the presence of contaminants outside what was originally believed to be unit boundaries (Lab reports are in Appendix III). This laboratory data coupled with the field data (test pit logs, Appendix II) allowed for the delineation of this unit's boundaries as indicated in Appendix I, Drawing E-3.

<u>Summary of Area "C" - Drum Trenches</u>

<u>Waste Type</u>
Organic contamination including volatiles, solvents, and halogenated organics. PCB's also identified as discussed in Appendix IV.

<u>Extent of Contamination</u>
Contamination present to saturated zone, approximately eight (8) feet throughout unit. Unit C occupies approximately 45,500 ft ^{3}. Possibly 800-2,400 buried drums present.

Volume of Contaminated Material

Removal to saturated zone would include 13,680 yd^3 of material. Removal of drums only 8,055 yd^3.

3.3.4 Area "D" - Oil Lagoon

The oil lagoon is another unit that was initially identified through the use of aerial photographs. Test pitting indicated that the contamination resulting from the oil lagoon extended much farther than the former lagoon boundary (see Appendix I, Drawing E-3). A black petroleum staining exists throughout much of the upper end of the southern back lot (see test pit logs, Appendix II) and is believed to be caused by the oil lagoon. Results of the analysis of three (3) soil samples collected from the perimeter of the lagoon are shown in Table 3-7.

Analytical results indicate presence of several organics that were found in some of the drummed waste encountered during test pitting in other areas of the back lot. Samples collected did not exhibit E.P. Toxicity. Although no drummed waste samples were collected in this area, several buried drums were encountered during test pitting.

Based on visual observations alone, it is believed that the extent of the oil lagoon is as depicted in Appendix I Drawing E-3.

Summary of Area "D" - Oil Lagoon

Waste Type
Petroleum hydrocarbons. Several organics in low concentrations.

Extent of Contamination
Contamination caused by the oil lagoon is believed to encompass an area of 65,000 ft^2 to an average depth of 8 feet. Possibility of 100-200 buried drums present, this area overlaps area "C".

Volume of Contaminated Material
Approximately 19,250 yd^3

Table 3-7
Chrysler - Trenton Chemical
Oil Lagoon Soil Samples
(Concentrations in ppm)

Parameter	D1001 (waste)	D1002 (soil 4')	D1003 (soil 4')
Chlorobenzene	73.6	BDL	BDL
2-Methyl Naphthelene	5.63	BDL	BDL
Phenanethene	BDL	2.55	BDL
Naphthalene	BDL	BDL	2.61

BDL - Below Detectable Limits
Formal lab reports are located in Appendix III.

3.3.5 Area "E" - Solvent Contaminated Soil

Area E, as outlined in Appendix I, Drawing E-3, is characterized by containing localized lenses of black stained soil. These lenses vary in depth from two (2) to twelve (12) feet and produce OVA readings in excess of 300 ppm. This area contains very few buried 55-gallon drums.

Four (4) soil samples were collected from Area "E" and analyzed for full range priority pollutants and RCRA characterization. Initial analytical results of contaminated material did not indicate the presence of any significant concentration of organics.

Although laboratory data did not suggest such it was believed, due to field observations, that extensive organic contamination was present in this area. For these reasons HART requested that the laboratory perform a library search of any and all peaks present on the chromatograms that were not identified as being priority pollutants. This was done in an attempt to identify the source of the extremely high OVA readings encountered while test pitting, in this area. After the chromatograms were examined there was no indication of any significant organic contamination present. After discussions with the laboratory it was determined that the causes of the above scenario may be: 1) Samples were not collected at the exact source of volatile contamination or 2) the source had volatilized prior to analysis.

Thus, TP-18 (Appendix I, Drawing E-3) was excavated in the center of "Area E" in hopes of identifying the source of the high OVA readings. Measures were taken to ensure proper sampling locations and guard against premature volatilization of the sample. Once TP-18 was excavated, OVA readings were taken and the highest two (2) point sources within the test pit were identified. A preliminary soil sample was collected at each point source and removed from the test pit. Upwind from the test pit, the samples were scanned with the OVA to determine if the points sampled were the source of the high OVA readings. Once two (2) locations were identified using this procedure, actual volatile organic samples were collected (VOA-1 and VOA-2) from each location and immediately iced. The data is presented in Table 3-8.

Table 3-8
Chrysler - Trenton Chemical
Soil Samples Area "E"
GC/MS Priority Pollutants Scan
Parts Per Billion (ppb)

Parameter	VOA-1 (ppb)	VOA-2 (ppb)
Chlorobenzene	500	480
Chloroethane	20.5	215
Ethylbenzene	BDL	135
Methylene Chloride	14.5	25.8
Total Xylenes	12	520
Acetone	51.5	120
Methylethyl Ketone	BDL	65
Aliphatic Hydrocarbons	---	10,000

BDL - Below detectable limits.

Summary of Area "G" - Solvent Area

Waste Type
Organic -OVA readings >300 ppm throughout much of the area. Elevated metal concentrations.

Extent of Contamination
Black staining of soil observed, on the average to seven (7) feet.

Volume of Contaminated Material
3,700 yd^3 in immediate area.

3.3.6 Area "H" - Sludge Area

The boundaries of the sludge contamination were fairly easy to determine on a visual basis. The sludge itself was an orange grey color and was easily discernibly from other materials on-site. Based on visual observations alone the boundaries of the sludge area were delineated and appear in Appendix I, Drawing E-3. Several soil samples were collected from within the unit itself in order to determine the types of contamination present. A summary of the results are given in Table 3-9 and formal lab reports are in Appendix III. All concentrations are in parts per million (ppm).

There appears to be organic contaminants from zero (0) to six (6) feet consistent with the types of contamination found elsewhere on-site. The sludge itself contains three (3) identifiable organics, the one of highest concentration being Naphthalene (215 ppm). Samples did not exhibit E.P. Toxicity.

Summary Area "H" - Sludge Area

Waste Type
Waste sludge containing organics.

Extent of Contamination
Sludge occupies an area of approximately 5415 ft^2 to an average depth of two (2) feet.

Table 3-9
Chrysler - Trenton Chemical
Area "H" - Sludge Area
Parts Per Million (ppm)

Parameter	H1001 (0-2')	H1002 (4')	H1003 (6')	H1004 (waste sludge)	H1005 (drum)
Xylene	BDL	BDL	1.73	BDL	BDL
Chrysene	BDL	BDL	2.21	BDL	BDL
Fluoranthene	BDL	BDL	3.78	BDL	BDL
Naphthalene	BDL	9.40	33.2	21.5	BDL
Phenanthrene	BDL	3.75	4.65	BDL	BDL
Pyrene	BDL	BDL	2.74	BDL	BDL
2-Methyl Naphthalene	BDL	5.01	7.77	54.8	BDL

BDL - Below detection limits

* E.P. Toxicity Analysis on leachate

Volume of Contaminated Material

400 yd^3

3.4 North Area of Backlot

The data reduction and analysis task of the investigation (compiling magnetometry data, ground penetrating radar data and historical aerial photographs) identified two (2) locations in the north area of the back lot requiring further study Area F and Area G.

3.4.1 Area "F"

Three (3) test pits were excavated in this area. The fill material removed appeared to be relatively clean and did not liberate any significant OVA readings. As a result of the rapid completion of test pitting in Area F, a fourth test pit was excavated (F-4). F-4 essentially runs the full length of the north area of the back lot. The soils removed from this excavation appeared to be relatively clean and did not liberate any significant OVA readings.

Ground water was present at depths ranging from 9-11 feet and was associated with a blackened staining of the capillary and saturated zone soils. The ground water also contained a "petroleum like" sheen on its surface.

At several discrete locations within the test pits in Area "F", fragments of 55-gallon drums were encountered. The fragments were severely mangled and appeared to be the result of random point source dumping of fill material. No visual waste materials were observed in or around any of these drum fragments and it was concluded that no waste management units were present in this area.

3.4.2 Area "G"

Two (2) bisection test pits were excavated in this area. The fill material contained a larger concentration of construction debris, bricks, plastic and foundry sand than was found in other excavation in the back lot area.

There was no staining evident or signs of contamination noted in the unsaturated zone. However, the capillary and saturated zones did exhibit a slight blackened staining. Ground water was encountered at 7.5' and there was a slight "petroleum like" sheen on the ground water surface.

As in Area "F", pieces or fragments of drums were found randomly dispersed among the fill material in this area. No waste materials were observed to be associated with these fragments. The fragments were severely mangled and did not appear to be associated with any waste management units.

In summary, no wastes disposal units were discovered in the north area of the back lot. Some mangled drum fragments were encountered but no visible waste materials were noted. The capillary and saturated zones did contain some blackened staining and some elevated OVA readings were recorded. The ground water had a "petroleum like" sheen on its surface.

3.5 Subsurface Investigation Performed Beneath the Foundation of the Friction Products Building

As part of the preliminary field investigation at Chrysler, Trenton Chemical Facility, a ground penetrating radar (GPR) survey was performed in the friction products building (Building 9 and 17). The objective of this survey was to attempt to prove or disprove allegations that drummed waste was incorporated in the construction fill material located beneath the building.

The survey identified a total of 28 point targets and 18 larger areas that generated anomalous data. It was the opinion of the radar operator that most of the anomalous data was not concentrations of buried drums, however, it was believed that the identified point targets could be buried pipes or rubble in the fill. The larger anomalies could be rubble, moisture pockets or other changes in the material itself.

HART recommended that two (2) areas be investigated in order to determine the identity of the reflectors or targets. One area of concern was situated near the ovens between columns C2, C3, D2 and D3. This area was identified by a shaded area on the floor plan (Appendix I, Drawing E-4) and the second area was located along transects C+10 (between columns 4 and 6) and C+20 (between columns 4 and 5). The radar data exhibited large reflectors in the same proximity along parallel transects.

HART subcontracted American Drilling to perform soil borings in each of the suspect areas identified.

Initially the 8.5" cement foundation was cored creating a 12" diameter hole. A skid mounted CME 45 drill rig was then maneuvered in place to advance the boring and continuous split spoon samples were taken. The samples were logged recording lithology, penetration resistance, water content and volatile organics present.

Boring number FB-B1 was located 24.75' south of column "C" and 23' east of column "2" (refer to Drawing E-4). The cored cement foundation was 8.5" thick. Underlying the foundation to a depth of 5.5' was a stiff yellow to grey black fine grained sand fill. From 5.5' to 10', was a less permeable hard light brown clayey silt, having slight plasticity. This clayey silt strata appeared to be a naturally occurring glacial deposit and has been encountered in numerous borings and excavations at the facility. At 10', auger refusal occurred and sampling revealed a light brown finely crystalline limestone.

Water was encountered in a thin 6" zone of the sand fill just overlying the less permeable clayey silt. In this saturated zone, the organic vapor analyzer (OVA) recorded a steady 20 ppm from the borehole (peaking at 40 ppm) indicating the presence of organic volatiles. (Boring number FB-B-2 was located 10' south of column "C" and 8' east of column "5" (refer to Drawing E-4). Initially 8.5" of cement was cored through the foundation. Underlying the foundation was a yellow to grey black fine sand fill to a depth of 9.5'. From 9.5' to 12' was a naturally occurring light grey brown silty clay glacial deposit. At 12', auger refusal occurred and the sample revealed a light pinkish brown, finely crystalline rock.

Water was found perched above the silty clay strata in the sand fill. Water was first encountered at C-5.5'. This saturated zone was hydrocarbon stained and a solvent petroleum smell. Both borings were filled with a cement bentonite grout to prevent a pathway for the vertical migration of contamination.

No evidence was obtained supporting allegations that buried drums are located beneath the friction products building. It appears that a perched ground water zone exists in the sand fill material overlying the less permeable naturally occurring silty clays.

The presence of organic volatiles was detected in the saturated zone. The specific origin of these organic volatiles has not been determined. However, it should be noted that most borings and excavations advanced into the saturated zone throughout the facility emitted OVA readings indicating the presence of organic volatiles.

4.0 CONCLUSIONS OF FIELD INVESTIGATION

As a result of the Phase II field investigations completed by HART, the following waste types and disposal areas were identified:

- o Two buried drum areas have been located with sample test results identifying the contents as organic solvents, paint sludges, solidified resins, adhesives and greases.
- o An abandoned, backfilled oil lagoon with analytical results of soil samples taken in this area identifying the presence of petroleum hydrocarbons, organics, and metals.
- o Solvent contaminated soils were also identified with soil sample test results showing the presence of organics and metals.
- o An area of sludge contaminated soils has been located; analytical test results from samples identified the presence of waste sludges with organics, copper, lead and zinc evident.

HART Drawing E-3, found in Appendix I, identifies the areas and their on-site locations.

The site presents complex conditions which require a sound technical approach to properly and effectively remediate the contamination. Certain waste types, such as the drums, are in a state of deterioration and require special handling and compatiblity testing. Other wastes, such the oil lagoon materials and the sludge contaminated soils, may require stabilization or fixation. The evidence gathered during the investigation indicates the best approach to the remediation of the problems is the removal of the waste from the site. This will involve an extensive excavation program for the southern portion of the back lot and proper handling and disposal procedures.

In addition to the variation in the waste types found at the site, there exists a similar variation in the controlling regulator requirements for disposal. While the majority of the waste streams to come from a cleanup would conform to the requirements of RCRA, certain wastes, such as the PCBs and the soils with organic solvent contamination greater than 1 %, will require handling and disposal as a TSCA waste (PCB) or treatment prior to disposal (solvent contamination). Furthermore, certain excavated materials are considered non-hazardous and can be treated accordingly. The Work Plan will outline procedures for removal and disposal of these wastes.

5.0 SITE REMEDIATION ACTIVITIES

This section of the report details the construction related aspects of the site remediation process. The activities, to be implemented as part of the closure of the southern portion of the site, are intended to remove the drums, soils with elevated levels of contamination, and produce an effective soil cover over these areas which will promote proper surface water management.

The work required to meet the above objectives will be classified as hazardous, and thus require an elevated level of protection for on-site personnel and additional monitoring activities for the protection of the plant personnel and residential population. The Health and Safety aspects of the remediation are not discussed herein, but are left to the Contractor for presentation prior to the implementaion of the project. The construction related tasks discussed herein to be undertaken as part of the work will include:

- Preparation of the site for construction activities, including the placement of temporary erosion control measures and site clearing and grubbing;

- Performance of the excavation and staging operations to remove the drums and contaminated soil in the Drum Trench Area, Drum Burial Area B, Sludge Disposal Area, Oil Lagoon Area, and the areas containing solvent and hydrocarbon contaminant;

- Transport and disposal of drums, soil and sludges containing elevated levels of contaminants;

- Backfill and placement of a soil cover of unclassified clean general fill over all the excavation areas to reduce infiltration and promote surface water management, and;

- Lining of the central drainage swale to reduce erosion and preclude movement of asbestos materials on the sideslopes.

5.1 Site Clearing

Clearing and grubbing of the site is required for the construction activities and to provide proper bonding between non-excavated soils and the soil covers to be placed. This activity will include removal and proper disposal of all vegetative material, including brush and trees, along with any other non-hazardous materials or obstructions that may hinder the construction activities and operations. In addition, site clearing will include removal of all surface debris. The debris shall be treated as hazardous and will be disposed of using the appropriate waste management technology.

Clearing and grubbing shall take place in all the areas of construction, to the extent required for construction purposes. Vegetative matter removed from above grade will be treated as non-hazardous, and may be chipped and mulched for later use at the site. Grubbed material, primarily the stumps that are removed during excavation, shall be treated as hazardous due to the soil clinging to the root structure, and disposed as such. Clearing of all surface material will take place in the near future, while any required subsurface grubbing will take place during site excavation.

5.2 Temporary Erosion Control

The proposed construction activities at the site are expected to disturb large surface areas. Clearing and grubbing activities and equipment movements will disturb the top surface layer of the site, leaving the soil exposed to potential erosion during storm events. To prevent the migration of soils with surface water runoff, temporary erosion control measures will be implemented.

Erosion control in the form of a silt fence will be placed downgradient of all construction areas and in other selected areas to act as a silt barrier. Amoco Propex Silt Stop, or equivalent, will be installed in accordance with the manufacturer's recommendations. The silt fencing will be placed prior to site clearing, which will take place in the near future.

The temporary erosion control measures will be maintained throughout the construction activities and until such time as the permanent erosion control measures have been installed or established. All installations will be inspected following each significant storm event and repaired as required. Repairs shall also be made immediately following any damage due to construction activities, such as equipment movements.

5.3 Decontamination Pad

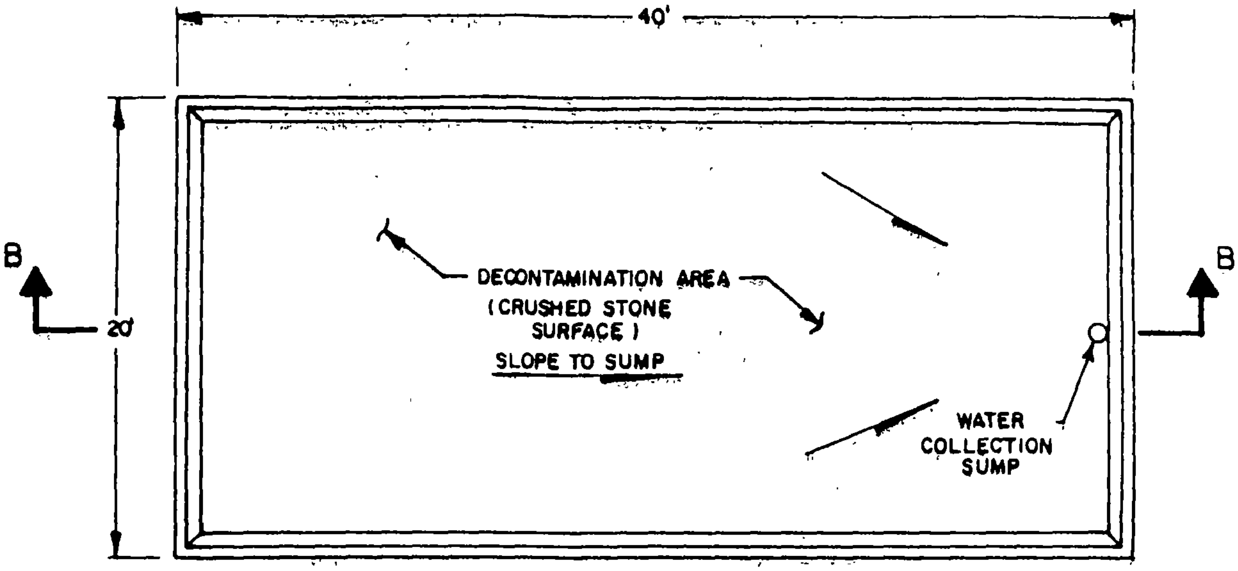
Due to the nature of the site, all vehicles leaving the construction area must be decontaminated to prevent the spread of surficial contaminants through the plant area. During the site preparation phase of the work, a decontamination pad similar to the one presented on Figure 5 will be constructed at the location noted on Drawing E14 in Appendix I. All vehicular traffic leaving the site must be clean of all accummulated dust and debris through the use of a high pressure water/steam generator. This will mitigate the potential for the transport of the contaminants off-site.

Collected rinsewater and rainwater will be considered contaminated and will be transferred to the onsite wastewater treatment plant for treatment prior to discharge.

5.4 Staging Area Construction

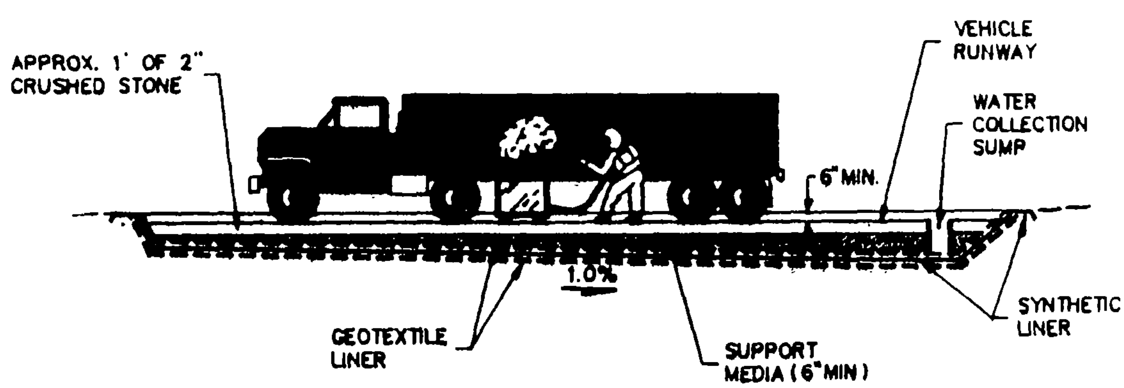
During the excavation work at the site, it is known that a large number of drummed wastes will be encountered. Therefore, staging areas will be built near the active excavation zone to handle uncovered drums safely and effectively. These staging areas will provide sufficient surface area for the adequate storage of staged drums and/or roll-off boxes.

The Contractor will be responsible for selecting the locations and sizes of the staging areas based upon his work practices, the number of drums and duration of staging, distance to the excavation, and safe distances from existing and/or temporary site facilities according to OSHA, EPA, and MDNR guidelines. The drum staging areas will be designed and constructed to meet the following criteria:



VEHICLE AND EQUIPMENT
DECONTAMINATION STATION

PLAN
NTS



SECTION B-B
N.T.S.

NOTE:

TRAINED TECHNICIANS SHOULD DECONTAMINATE WHEELS AND UNDERCARRIAGES OF LOADED VEHICLES AND/OR EQUIPMENT USING PORTABLE STEAM/HIGH PRESSURE WATER UNITS.

WASH WATER GENERATED DURING THIS OPERATION SHALL BE COLLECTED AT A COMMON SUMP AND PUMPED DIRECTLY TO A BULK LIQUID TRAILER OR ABOVE GRADE STORAGE TANK FOR ON-SITE PROCESSING OR OFF-SITE TREATMENT AND/OR DISPOSAL.

FIGURE 5

DECONTAMINATION PAD CONSTRUCTION

- The liner shall be Visqueen, or approved equivalent;

- The liner shall be placed on a subgrade that is free of objects and/or soils that would puncture the liner;

- The area shall be located and constructed so that surface water is diverted from flowing onto the lined surface;

- The area will be provided with a containment berm around the perimeter of the liner area;

- The liner area will be sloped to provide positive drainage to a sump located on the periphery of the liner area; and

- A sump will be provided with an explosion proof submersible sump pump compatible with the anticipated leachate and capable of pumping expected flow (including flow generated by precipitation) to a storage tank for later treatment.

By keeping the staging areas to a small workable size near the excavation, the Contractor can work effectively without destroying the staging area linings with equipment movements across a larger fixed area. The areas can also be set up at various convenient locations on the site which would not hinder equipment movement and worker safety during drum handling activities.

5.5 Excavation and Staging

Drawing E14 in Appendix I shows the proper area of work activities as part of the site remediation. This area is subject to final verification of the extent and limits during the actual field activities by sample collection and analysis of the excavation sidewalls.

The excavation will begin at the southern end of Drum Burial Area B and will progress in a northerly direction toward the drainage swale. The rationale for this approach is two-fold: (1) this will allow for the immediate excavation and removal of the drums damaged during the test pit operations of the field investigation; and (2) it will prevent re-contamination of completed areas that a selective excavation approach may cause. The materials that are not contaminated but require excavation, such as the surface cap previously placed at the site, will be set aside for use as backfill.

The description of the various excavation related tasks that must be undertaken are presented in the following sections.

5.5.1 Contaminated Soil Removal

The excavation of the contaminated materials at the site will be performed with a backhoe. This material will be staged, tested, and then loaded onto trucks for disposal. The excavations will progress to the groundwater level in the area.

Over-the-road tractor-trailer (18 wheel min.) dump trucks will be used to transport the contaminated materials. The beds of these trucks will be lined with polyethylene prior to being filled with material. Each trailer will be loaded with soil and other materials to a level below the sideboards of the trailer and so as not to exceed the gross vehicle weights established by the departments of transportation of the states that the truck must pass through to the disposal site. The polyethylene should be closed and sealed around the truck load when filled, and a protective tarpaulin placed over the trailer and secured. This will minimize the spread or loss of material due to wind and air movements around the truck during transit. The trucks must be decontaminated prior to leaving the site (see Section 5.3).

5.5.2 Subsurface Drum Removal

As the excavation progresses, drums are expected to be encountered beneath the surface. The backhoe will be utilized to remove as much soil as possible to allow easy access to the drum by a barrel grappler. The actual removal of the drums from the excavation will be under the direction of the On-Site Coordinator. The On-Site Coordinator will determine if the drum may be cleanly removed with the barrel grappler or whether it should be taken out in the bucket of the backhoe along with soils. In any situation where the potential exists for drum rupture or leakage, the drum will be removed by the backhoe bucket.

As the drums are removed from the soil, site personnel, in conjunction with the On-Site Coordinator, will characterize and determine the condition and integrity of each drum and record this data into the drum log. Four options for handling these drums will be considered: (1) drums which appear structurally intact and suitable for further handling will be left as-is and labeled; (2) drums which are visibly damaged or leaking will be placed into an overpack drum (85 gallons) by the barrel grappler; (3) if the drums are deteriorated to the point where any further attempt to move or handle the drum will cause a rupture or a leak, a portable transfer pump will be used to transfer the material to a new drum. If the material is a solid, it will be transferred to a new DOT-approved container by another appropriate technique; and (4) drums which are determined to be RCRA-empty (less than 1 inch of residue) will be crushed by the backhoe or grappler and transferred to a crush pile. This pile will be in an area adjacent to the staging area. The exact location will depend upon the areas of excavation and will be determined by the On-Site Coordinator. The On-Site Coordinator will be responsible for making all field decisions concerning movement of drums, over-packing, transfer of contents and drum crushing.

5.5.3 Staging

Following removal from the excavation, soils and drums will be placed in a staging area as described in Section 5.4. The soils will be segregated by the area identification, which roughly delineates the types of contamination present. The drums will be grouped in accordance with physical characteristics and visual observations, and will be sampled as composite groups for waste characterization analysis. After the results of the compatibility analyses are available, compatible wastes streams will be bulked (solids into drums and/or roll-off containers; liquids and sludges into drums and/or tanks).

5.5.4 Analytical Sampling and Testing

Based on the field investigations performed to date, insufficient information exists to fully characterize the chemical contamination in the soil. Thus, the soils will be staged and tested, then loaded into trucks for transport. As the known limits of contamination are reached, samples will be taken at 50 foot intervals along the sidewalls to determine if the background contamination limits have been reached.

The drums in the staging area will be sampled in composite groups for waste characterization. If samples cannot be obtained through existing holes and openings, the drums will be opened with the use of non-sparking hand tools (brass hand punch and mallet). Depending upon the situation and available equipment, a brass barrel punch attached to a backhoe may be used. Samples will then be collected by using hollow glass tubes or stainless steel trowels. Field data and visual characteristics will be recorded on the field drum log (i.e., appearance, viscosity, multi-phase, solid, liquid, etc.).

The required analysis will include the parameters of the EPA Priority Pollutant List plus the parameters presented in Table 5-1. Other tests on soil and drum samples may be dictated based on conditions encountered in the field.

5.5.5 Stabilization

It is anticipated that during the site excavation free sludges and other viscous materials will be encountered at the site, primarily in the areas of the backfilled oil lagoon and sludge disposal area. In addition, it is anticipated that some soils onsite may be ameneable to stabilization. These materials will be segregated from the rest of the wastes for stabilization.

A temporary pug mill or other stabililization methodolgy will be established nearby to undertake this task. The stabilization methodology will be established following performance testing by the remediation contractor to determine the optimum material and procedure for the stabilization.

TABLE 5-1

WASTE CHARACTERIZATION PARAMETERS
CHRYSLER CHEMICAL DIVISION
TRENTON, MICHIGAN FACILITY

<u>RCRA METALS</u> (EP TOX LEACHATE)

Arsenic
Barium
Cadmium
Chromium
Copper
Lead
Mercury
Selenium
Silver
Zinc

<u>PESTICIDES</u> (EP TOX LEACHATE)

Lindane
Endrin
Methoxychlor
Toxaphene

<u>HERBICIDES</u> (EP TOX LEACHATE)

2,4-D
2,4,5-TP

<u>RCRA CHARACTERISTICS</u>

Description - Physical (Paint Filter Test)
Water Reactivity
Water Solubility
Hexane Solubility
Peroxide
Oxidizer
Bielstein
pH
Sulfide
Cyanide
Flash Point, SF, CC @ 60°c
PCB Screen
Total HOC of Part 261, Appendix VIII

5.6 Transport and Disposal

The materials leaving the site will be considered industrial wastes, and must be handled by licensed haulers conforming to the rules and regulations of the State of Michigan and the U.S. Department of Transportation regarding the transport of such materials.

There will be four waste management technologies employed at the Chrysler-Trenton Facility for the disposal of the materials. After the waste materials have been characterized and segregated, they will be disposed of according to the proper waste management technology. The four modes of disposal are:

- o Incineration
- o Landfill
- o Sludge Stabilization and Fixation
- o Waste Water Treatment

Wastes containing organic compounds in concentrations greater than 1%, and meeting proper incineration properties, may be taken to an off-site incinerator located at an approved TSD facility, or treated prior to landfill disposal.

Materials not meeting the criteria developed for incineration or treatment will be further classified as hazardous or non-hazardous:

- o The materials classified as hazardous waste will then be disposed of in an approved hazardous waste management landfill.

- o Materials classified as non-hazardous will then be disposed of at an approved non-hazardous waste management landfill.

The third disposal technology is sludge stabilization and fixation. An on-site pug mill will be used to stabilize waste liquids and waste sludges, which do not meet incineration criteria. The stabilized materials will then be classified as hazardous or non-hazardous and landfilled according to the previously discussed outline.

The final disposal technology is waste water treatment. Waste water, which is generated from site decontamination procedures will be collected, analyzed, then transported to an approved waste water treatment facility.

The proper method of disposal will be determined through sampling and subsequent analysis. The site coordinator will work closely with the regional environmental agencies and TSD facilities to assure that the most effective yet cost efficient disposal options are being pursued.

5.7 Central Drainage Swale

The site is bisected by a central drainage swale, which flows west to east, from the facility to the Detroit River. Currently, the swale receives inflow from three (3) 8 in. dia. conduits then outflows through an 18 in. dia. riser assembly conduit which empties into the Detroit River.

The soils adjacent to the southern edge of the swale are to be excavated in accordance with the work described in section 5.5, the soil analyzed, then disposed of using the appropriate waste management technology.

Upon completion of the remedial activities, the southern side slope will be backfilled (if required) to the appropriate grades, and geotextile fabric and riprap placed throughout the swale to present the movement of asbestos materials from the northern side slope and for general erosion protection. Figure 6 presents the final swale configuration.

5.8 General Fill Placement

Following completion of the excavation work in a given area, the excavation will be returned to near the original grades for proper surface water management. This will be done as soon as possible following completion of the excavation to preclude any adverse environmental impacts and other site safety problems.

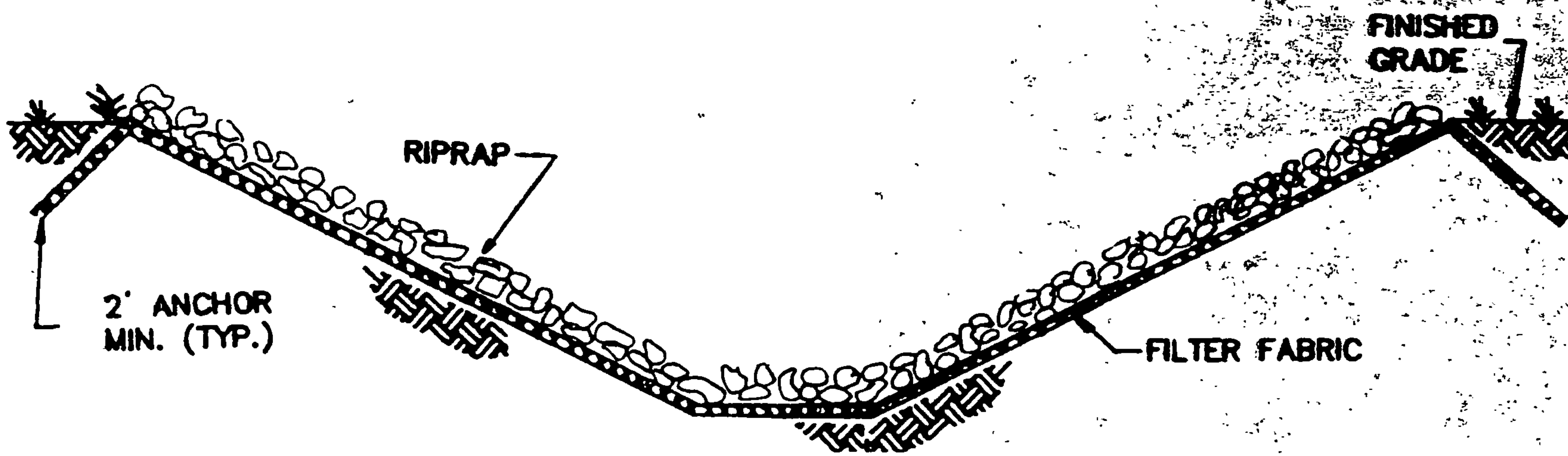


FIGURE 6

CHRYSLER CORPORATION

TRENTON CHEMICAL PROJECT
CENTRAL DRAINAGE SWALE

N.T.S.

In addition, a foot of general fill is to be placed over the site area to the north of the central drainage swale. The fill placement, which will proceed in the near future, will prevent contact with surface asbestos during the site remediation process.

The material used shall be an unclassified general fill from a pre-approved non-contaminated offsite source, or from onsite excavations of non-contaminated soils, such as the existing soil covers. The unclassified general fill soil shall be a structural-type fill, and shall contain particles no larger than 6 inches in mean diameter. Trees, root, organic (humus) materials and other general debris shall be excluded from this fill. The top foot of the fill shall be a natural soil capable of supporting vegetative growth, with no particles larger than 3 inches in mean diameter (see Section 5.8).

Where applicable the subgrade shall be grubbed and disced prior to fill placement to provide proper bonding between the fill and the in situ materials. Fill placement will occur in maximum 12 inch thick lifts. Each lift shall be compacted to 90 percent of Standard Proctor and scarified prior to the placement of the next lift.

The fill placement shall be inspected and controlled by the Engineer using visual techniques and a nuclear densometer to verify proper placement. Material density and optimum moisture content shall be determined for each type of fill material encountered, using the standards set forth by the American Society for Testing and Materials (ASTM), specifically designation D698-78, "Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb. (2.49-kg) Rammer and 12-in. (305-mm) Drop". A minimum of one nuclear density test shall be performed for every 10,000 square feet of fill placed in a lift.

5.9 Site Revegetation

5.9.1 Soil Placement

The most critical component of permanent site erosion protection for the Trenton Facility Site is the final surface treatment and revegatation. The revegetation program proposed for this final closure plan has been prepared with state of the art technology as developed through research at Rutgers University, which is presented in the EPA publication "Standarized Proceduresfor Planting Vegetation on Completed Sanitary Landfills". In general, with proper slope preparation and vegetation practices, the final vegetated surface is the single most important factor in reducing erosion at the site. Establishment of permanent vegetation requires a growth medium both physically and chemically capable of supporting plant growth and, proper selection and planting of compatible grass species.

The soil used on the surface must be of such a quality such that it can sustain a dense stand of vegetation. The soil will be tested for pH, Mg, Ca, P, K, NO_3, NH_4, conductivity, Cu, Fe, Zn, Mn, particle size distribution, bulk density, and organic matter. Four to five samples should be collected per acre. Soil tests should be performed by a certified Agricultural testing firm to indicate whether amendments and/or conditioning is required for acceptable seed germination and growth. These amendments should be applied according to soil test recommendations and mixed into the soil prior to seeding.

5.9.2 Seedbed Preparation

The area to be revegetated shall have a seedbed prepared in a manner so as to:

1. Provide adequate soil/seed contact in order to enhance seed germination.

2. Enhance plant root penetration and developments.

3. Retard soil erosion.

4. Improve water availability within the root zone.

Seedbed preparation shall be accomplished, where accessible, by using springtooth harrows, tandem discs, or other secondary agricultural tillage equipment which can satisfy the seedbed preparation requirements. Soil materials shall be worked to a depth of three to six inches over the area with this equipment when sufficiently dry to avoid clodding and excessive compaction. Excessively compacted layers of topsoil will be avoided, as much as practical, by mixing organic matter with the soil before it is spread, spreading only when mositure content is acceptable, and by using earth-moving machinery other than a scraper. If several different soils will be used as the topsoil material, they should be mixed together and spread as a unit, not in separate layers. Spreading soil in at full depth will promote less overall compaction, increases water movement, and better root growth than spreading in several thin layers. Seedbed preparations shall take place in as short a time as possible prior to seeding in order to minimize the time that the prepared seedbed is allowed to remain subject to water and wind erosion without vegetation protection.

In the event that seeding cannot occur immediately upon completion of diversion and cover construction, the prepared areas shall be temporarily stabilized with mulch until the appropriate seeding time.

5.9.3 Seeding and Mulching

Seeding - Suggested seeding mixtures for permanent vegetative cover is presented in Table 2. If hydroseeding is utilized, fertilizer and lime may be included with the seed in the slurry mixture, at the rates specified in Table 2. Hydroseeded soil must not be compacted during spreading and must be very friable at seeding time. Seed will germinate beneath the mulch on hard, compacted soil, but the roots will not penetrate the surface soil and succumb to drought.

Seeding will be performed only during the optimum seeding periods of March 15 to May 1 or August 15 to September 15. If seeding cannot occur during these periods, disturb areas will be temporarily stabilized with anchored mulch.

TABLE 5-2

SUGGESTED HERBACEOUS SPECIFIES FOR EROSION CONTROL

Geographic Regions	Seeding Time	Temporary (quick cover annual) species (use one with permanent mix) Name	Seeding Rate (lb/acre)	Permanent (long lived) perennial species Name	Seeding Rate (lb/acre)
Northeast &	Early Spring	Annual Ryegrass	25	Ky-31 Tall Fescue and	75
North Central	to	Perennial Ryegrass	50	Birdsfoot Trefoil or	30
U.S. and	Mid Spring	Oats	75	Crownvetch or	50
Northern		Weeping Lovegrass	10	Flatpea	80
Appalachia					
	Mid Spring	Foxtail Millet	40	Ky-31 Tall Fescue and	75
	to	Japanese Millet	50	Birdsfoot Trefoil or	30
	Mid Summer	Weeping Lovegrass	10	Crownvetch or	50
				Flatpea	80
	Late Summer	Rye	80	Ky-31 Tall Fescue and	75
	to	Winter Wheat	80	Birdsfoot Trefoil or	30
	Early Fall	Annual Ryegrass	25	Crownvetch	50

Mulching - Mulch will be placed immediately after seeding, to promote vegetative growth and stabilize the surface. Mulch will consist of either unrotten hay or small grain straw spread uniformly at a rate of 2 1/2 to 3 tons per acre and anchored immediately after placement. Mulch anchoring will consist of liquid mulch binder or netting tiedown. Liquid mulch binders, when used, will consist of one of the following:

- Synthetic or organic binders such as Curasol, Terra-Tack 1, or equivalent at rates recommended by the manufacturer, or

- Combined wood cellulose fiber mulch/tack such as Conwed Hydro Mulch or equivalent, at a rate of 400 lb. per acre.

Mulching nettings may be used in place of liquid mulch binders. Mulch nettings will consist of either jute, paper, excelsior, cotton, or plastic, and will be anchored at three foot centers by firmly stapling the netting into the soil over the straw or hay mulch. Regardless of the anchoring method employed, mulch anchoring will be performed immediately after placement of hay or straw mulch.

6.0 SCHEDULE OF IMPLEMENTATION

Due to the complex nature of the remediation activities to be undertaken at the site, HART anticipates that it will take approximately 2 years to complete the work described in Section 5.0. The anticipated construction schedule is presented as Figure 7.

WP-D-#2

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FIGURE 7
ANTICIPATED PROJECT DURATION
SITE REMEDIATION ACTIVITIES
CHRYSLER CORPORATION TRENTON, MICHIGAN FACILITY